NATIONAL® CANCER INSTITUTE

NCI Alliance for Nanotechnology in Cancer

Mission

To help meet the goal of eliminating suffering and death due to cancer, the National Cancer Institute (NCI), part of the National Institutes of Health, is engaged in efforts to harness the power of nanotechnology to radically change the way we diagnose, treat and prevent cancer.

NCI Alliance for Nanotechnology in Cancer

The NCI Alliance for Nanotechnology in Cancer is a comprehensive, systematized initiative encompassing the public and private sectors, designed to accelerate the application of the best capabilities of nanotechnology to cancer.

Currently, scientists are limited in their ability to turn promising molecular discoveries into benefits for cancer patients. Nanotechnology can provide the technical power and tools that will enable those developing new diagnostics, therapeutics, and preventives to keep pace with today's explosion in knowledge about cancer.

Goals of the NCI Alliance

To harness the potential of nanotechnology in cancer, the Alliance goals are to develop:

- Research tools to identify new biological targets
- Agents to monitor predictive molecular changes and prevent precancerous cells from becoming malignant
- Imaging agents and diagnostics to detect cancer in the earliest, most easily treatable, pre-symptomatic stage
- Multi-functional targeted devices to deliver multiple therapeutic agents directly to cancer cells
- Systems to provide real-time assessments of therapeutic and surgical efficacy
- Novel methods to manage symptoms that reduce quality of life

Implementation of the NCI Alliance

The NCI Alliance is built on a strong foundation of science and scientific accomplishment. With input from a broad cross-section of the cancer research and clinical oncology community, a Cancer Nanotechnology Plan has been developed to guide the implementation of the NCI Alliance.

Under this Plan the NCI has established four major programs:

Centers of Cancer Nanotechnology Excellence (CCNEs)

The newly established CCNEs serve as hubs to develop and apply nanotechnology and nanoscience solutions to the diagnosis and treatment of cancer. The goals of the CCNE network are to design and test nanomaterials and nanodevices and to translate their use into clinical research, resulting ultimately in the introduction of novel diagnostic tools and techniques to combat cancer processes. The CCNEs will bridge gaps in the development pipeline from materials discovery to testing in clinical trials.

By balancing structured directives with investigator-initiated research, these Centers bring together the interdisciplinary teams from existing NCI resources and provide the infrastructure necessary to develop and translate nanotechnology advances to the clinic. By providing the resources and leveraging the expertise of the NCI, the CCNE network will accelerate the pace of product approval, commercialization, and delivery to cancer patients.

Multidisciplinary Research Training and Team Development

The NCI has created the incentives necessary to integrate nanotechnology into the mainstream of basic and applied cancer research. The Alliance supports training and career development initiatives to establish integrated teams of cancer researchers, including epidemiologists and engineers with the cancer biology and physical science skills and knowledge base of nanotechnology, to approach the fundamental challenges of cancer.

The NCI is initially using existing training and career development mechanisms to direct talent to this area as quickly as possible. The NCI also encourages program development with interfaces to the training programs of other federal agencies.

The advantage of these training and interagency collaborations is to rapidly translate knowledge from fundamental nanotechnology sciences into directed application in cancer biology.

Nanotechnology Platforms for Cancer Research

The NCI has identified to the R&D community specific technology requirements and cancer biology problems that constitute critical nanotechnology platform needs for cancer. These directed research programs are funding technology development projects through both grants and contracts overseen by project specialists.

The technology programs have created platforms that are aimed at deployment for clinical application in cancer research. Applicants are required to team with the NCI to develop a plan for dissemination of the technology. Examples of these platform needs include, but are not limited to:

- Molecular Imaging and Early Detection
- *In Vivo* Nanotechnology Imaging Systems
- Reporters of Efficacy
- Multifunctional Therapeutics
- Prevention and Control
- Research Enablers

Nanotechnology Characterization Laboratory (NCL)

Through a collaboration with the National Institute of Standards and Technology (NIST), the Nanotechnology Characterization Laboratory is developing data that will facilitate standards for nanoscale devices and facilitate regulatory review of these products prior to market release.

The NCL is facilitating collaborations among the NCI, academia, and the private sector to accelerate the translation of nanotechnology research into clinical advances.

The NCL will provide a comprehensive set of baseline characterization parameters that will enable cancer biologists, drug and diagnostic developers, and clinical oncologists to concentrate on what they do best—applying nanoscale tools to solving problems that most affect cancer patients. Through a collaboration with the U.S. Food and Drug Administration (FDA), this work will also lay a scientific foundation that will enable the FDA to make decisions concerning the testing and approval of nanoscale cancer diagnostics, imaging agents, and therapeutics.

Benefits of the NCI Alliance

The NCI Alliance for Nanotechnology in Cancer is an integrated, milestone driven, and product oriented program with targeted objectives and goals, initiated to capitalize on today's opportunities to create the tools that both clinicians and cancer researchers need now to eliminate suffering and death due to cancer.

By working to fulfill this core mission of the NCI, the Alliance offers the scientific community opportunities for accomplishment and leadership as they work toward their common goal: the reduction and elimination of the burden of cancer for all who are in need.

For More Information

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